to *Ottelia ovalifolia*).—On a compiled catalogue of latitude stars, epoch 1880, by H. S. Hawkins.—On the occurrence of remarkable boulders in the Hawkesburg rocks, by C. S. Wilkinson.—On the Wentworth hurricane, by H. C. Russell.—Abstract of the meteorological observations taken at the Sydney Observatory, by H. C. Russell, (January to December, 1879).

*American Journal of Science*, December, 1880.—Note on the zodiacal light, by H. C. Lewis.—The early stages of renilla, by E. B. Wilson.—Geological relations of the limestone belts of Westchester, co. New York, by S. D. Dana.—Abstract of some palæontogical studies of the life-history of *Spirifer brevis*, H, by H. S. Williams.—Index to vols. xi.-xx.

*Journal of the Franklin Institute*, January.—Experiments with the Parkins machinery of the steam yacht *Anthracite*, by Chief-Engineer Isherwood.—The determination of silicon and titanium in pig-iron and steel, by Dr. Drown and Mr. Shimer.—An adaptation of Bessemer plant to the basic process, by Mr. Holley.—The value of the study of the mechanical theory of heat, by Mr. Wolff.—Blasting, by Mr. Kirk.—On the wholesomeness of drinking-water, by Mr. Haines.—An inquiry into the laws of the beautiful in music, by Prof. Clarke.

THE last number of the *Journal* of the Physical and Chemical Society (Russian) contains, besides minutes of meetings, papers on the electrolyse of formic and mellite acids, by M. N. Bunge.—On the variations of the quantity and pressure of oxygen in the lungs, by Prof. Ivan Setchenoff.—On products of the decomposition of albuminous matters, by Dr. Danilevsky.—On hops, by M. Tchekh; and several smaller notes on organic chemistry.—In the physical part, M. Shvedoff continues his researches on hail, trying to establish by various very interesting arguments the cosmic origin of hail, which he considers as a variety of meteorites.—M. Reinboth describes a new naphtha barometer which has a great sensibility.—M. Van der Flith gives several new mathematical formulæ concerning electrodynamics.

THE *Schriften der physikalisch-ökonomischen Gesellschaft zu Königsberg* (1879, i. and ii.; 1880, i.).—These parts contain the following papers:—On the *Uredo* fungus, by Dr. Caspary.—On the Gasträa theory, by Prof. Kupffer.—On pisciculture, by Dr. Seidlitz.—On some acoustical and optical experiments with the telephone, by Prof. Berthold.—On the phonograph, by Dr. Zenker.—On the ancestors of carnivora, by Dr. Albrecht.—What is species, and what variety? by Dr. Caspary.—On bacteria, by Dr. Baumgarten.—On the observations made at the station for measuring the temperature of the soil in various depths at the Botanical Gardens at Königsberg, by Prof. E. Dorn.—On some periodical phenomena in inorganic nature, by Dr. Jentsch.—On the ancestors of hoofed animals and Edentata, by Dr. Albrecht.—On the rhythmical motions in the animal and in the human body, by Prof. Grünhagen.—On the fauna of New Zealand, by Prof. Zaddach.—On the archæopteryx, by Prof. Zaddach.—On the ancestors of rodentia, by Dr. Albrecht.

*Bulletin de l'Academie Royale des Sciences* (*de Belgique*), No. 12, 1880.—Application of the tuning-fork to study of the propagation of sound and vibratory movements in liquids, by M. Montigny.—On the falling stars of November 27, 1880, observed at Brussels Observatory, by M. Houzeau.—On two plesiosaurs of the lower lias of Luxembourg, by M. van Beneden.—Science and the imagination (lecture at public *séance*), by M. Stas.—Voyages and metamorphoses of a drop of water, by M. Van der Mensbrugghe.—Announcement of the results of prize competitions.—Reports on memoirs, &c.

*Rivista Scientifico-Industriale*, No. 1, January 15.—Singular verticillate configuration (in the form of a rose) of the laminæ of crystallised water, by Prof. Bombicci.—On storms, by Prof. Cantoni.—A modification of the Ruhmkorff coil, by Dr. Scarpa and S. Baldo.—Two new species in the Mediterranean fauna, by Prof. Richiardi.—Some ammonites of the middle lias, by S. Canavari.—Paramagnetism and diamagnetism of liquids, by Prof. Marangoni.—Experiments proving that air saturated with moisture is an insulator as well as dry air, by the same.

*Journal de Physique*, January.—Atmospheric absorption of ultra-violet radiations, by M. Cornu.—Experimental researches on the psychrometer, by M. Macé de Lépinay.—On the division of instantaneous currents, by M. Brillouin.—Electric *explorateur* of M. Trouvé, by M. Guriel.—M. Trouvé's apparatus for examination of deep natural or artificial cavities, by the same.—On resultant sounds, by M. Nicotra.

## SOCIETIES AND ACADEMIES

### LONDON

**Royal Society**, February 3.—Prof. Owen read a third part of his description of the great extinct horned lizard of Australia (*Megalania prisca*). The materials had been transmitted from the same formation and locality-petrified drift-bed of King's Creek, Queensland, as the subjects of Part 2, and were discovered by Mr. Geo. Fred. Bennett, about thirty feet from the fossil skull. They proved to be, when recomposed, the opposite extremity of the animal, and consisted of an ossified sheath of the tail, in annular segments supporting conical cores of horn-like weapons. Of these segments the three terminal ones had coalesced; a fourth detached segment fitted the antepenultimate ring. Each ring, save the last, supported two pairs of horn-cores, of which dimensions were given and drawings exhibited of the natural size. From tip to tip of the dorsal pair of the antepenultimate segment measured ten inches. In this segment was included the corresponding vertebra, exemplifying the caudal modifications of the type of the dorsal, sacral, and other vertebræ of *Megalania* described in the parts communicated to the Royal Society in 1858 and 1880. The author then entered into an exhaustive review of analogous caudal armatures in other animals. The nearest approach, in the class *Reptilia*, was made by the small existing Australian lizard (*Moloch horridus*) and by the *Uromastix princeps*, recently described by the late Arthur W. E. O'Shaughnessy, of whom Prof. Owen spoke in terms of deep regret and respect.

The supports of the caudal horns or spines in the above small lizards retained the immature condition of fibro-cartilage. Examples where histological development had proceeded to ossification were cited from recent and fossil *Reptilia*. In the latter the nearest approach to the caudal armature of *Megalania* was presented by the *Scelidosaurus*, of the Dorsetshire lias. A still nearer resemblance to the singular structures described in the present paper was made by certain extinct species of gigantic armadillos, e.g. *Glyptodon asper*, from South American tertiaries.

The author associated this repetition or lingering of a reptilian osteodermal character in the mammalian class with the previously-known repetition of the horny scutation of lizards in the mammalian pangolins (*Manis*); he referred to the low dental condition in the numerous similar simple teeth of armadillos and the still lower characters which had suggested the ordinal term "Edentata." He cited the tenacity of life and long continuance of the muscular irritability after death in the sloths; the winter sleep of bats and certain rodents, with their faculty of circulating blood in the venous state; the quills in hedgehogs and porcupines as indicative of a repetition of a dermal character of an oviparous class; the anatomical modifications giving a faculty of flight, as in Pterosaurians.

The sole common organic character of, and peculiar to, such members of a large and otherwise much varied group of mammals was a cerebrum, small, not extending upon the cerebellum, smooth or with few and simple convolutions, but with the hippocampal commissure ascending to connect the hemispheres above the lateral ventricles, and so constituting the anthropotomical "corpus callosum." A still lower group of mammals had no such commissural development, but this common cerebral character was associated with as many and great variations of inferior structures as in the *Lissencephala*. The *Lyencephala* included the marsupials and monotremes.

In the discussion which followed the reading of the paper the chief objection was an averment that the author had no evidence of its subjects having belonged to *Megalania prisca*, and that they were more probably parts of some Chelonian reptile.

To this the author replied that he had evidence both negative and positive. From the year 1857 he had received parts of the skeleton of a great terrestrial reptile from localities hundreds of miles apart in the provinces of New South Wales, Victoria, Queensland, but not a single fragment of a carapace, plastron, or other characteristic part of a Chelonian; every large reptilian fossil was not only "Lacertian," but of the very genus and species *Megalania prisca*. Perhaps no part of the axial skeleton was more differentiated than the occipital vertebra in a lizard and a tortoise. In the latter the elements remained as distinct as in a fish; in the former as confluent as in the mammal; this at least was the case in *Moloch* as it is in *Megalania*. Finally Prof. Owen pointed to the vertebra in organic connection with the tail-sheath in the fossils last received; it was Lacertian, not Chelonian.

"On a Method of Destroying the Effects of Slight Errors of Adjustment in Experiments of Changes of Refrangibility due to Relative Motions in the Line of Sight," by E. J. Stone, F.R.S., Director of the Radcliffe Observatory, Oxford.

Let arrangements be made for the reversion of the prisms without any disturbance of the other optical arrangements, including, of course, the position of the cylindrical lens, if one be used. Any slight errors of adjustment which prevent the light from the star and the comparison light from falling upon the train of prisms under the same optical circumstances, so far as mere direction is concerned, will have opposite effects in the reversed positions of the prisms; but the separation of the emergent lights due to relative motion will remain unchanged by the reversal of the positions of the prisms.

If, therefore, the apparent change of refrangibility due to relative motion remains unchanged by the reversion of the prisms, all doubts about the effects of errors of adjustment will be removed. But if the results in the reversed positions of the prisms sensibly differ, then the existing errors of adjustment must be removed, or their effects allowed for by taking a mean of the results in reversed positions, before any reliance can be fairly placed upon the determination of relative motions in the line of sight.

A reversible spectroscope was arranged by me, and made by Mr. Simms, some years ago, but I have never since had an equatorial, with a good driving clock, under my control, with which the experiment indicated could be properly tried.

With the direct prisms now in use the required reversion can be easily arranged. I am not likely for some time to have the use of a good equatorial, and I therefore publish the plan with the hope that some one more fortunately situated may give it a fair trial.

The experiment is a crucial one, and in my opinion should be tried.

**Chemical Society,** February 3.—Dr. Gladstone, vice-president, in the chair.—It was announced that a ballot for the election of Fellows would take place at the next meeting of the Society.—The following papers were read:—On the estimation of organic carbon in air, by Drs. Dupré and Hake. The carbon is converted into carbonic acid by passing the air over heated oxide of copper; the carbonic acid thus produced is absorbed by baryta water, and the carbonate is converted into sulphate which is weighed. The carbonic acid present in the air, as such, is estimated in a similar way and deducted. The mean quantity of organic carbon in ten litres of ordinary London air was 0·000154; Boussingault and Verser found ten times as much. The authors also refer to the results obtained by Pettenkofer in his well-known experiments on the elimination by animals of H and $CH_4$. Pettenkofer seems to have entirely neglected the organic carbon in the atmosphere, and thus his results require very important corrections.—On the action of the copper-zinc couple upon nitrates and the estimation of nitric acid in water analysis, by M. W. Williams. Some strips of clean zinc foil are placed in a wide mouth stoppered bottle and covered with a 3 per cent. solution of copper sulphate: when the zinc has acquired a sufficient coating of copper the solution is poured off and the copper zinc couple washed. The water to be analysed is then poured on the couple and allowed to remain for some hours at 24° C., after the addition of a little pure sodium chloride. The nitrates are thus completely converted into ammonia, which is estimated by nesslerising.—On the position taken by the nitro-group on nitrating the dibromo-toluenes, by R. Nevile and A. Winther.—On some of the various derivatives of toluene and the toluidines, by R. Nevile and A. Winther.

**Anthropological Institute,** January 25.—Anniversary Meeting.—Edward B. Tylor, F.R.S., president, in the chair.—Dr. Tylor, the retiring president, gave the annual address on the year's progress of the science of man and civilisation. He described the excellent arrangements in the United States for supplying Indian agents, missionaries, and others in contact with native tribes, with manuals to guide them in collecting information as to laws, customs, languages, religion, &c., the very memory of which will die out with the present generation of Indians. He contrasted the active intelligence of the United States in this with the fact that the Dominion of Canada, though kindly and wise in their practical management of the Indians, do not seem alive to the value of the scientific knowledge which is being lost among them for want of a little cost and trouble in collecting it. Dr. Tylor also spoke of Prof. Flower's study of the mountaineers of Fiji, the Kai Colo, a race who have the narrowest skulls of all mankind. The public have not yet become aware of the value of minute measurement of skull-dimensions, but Prof. Flower has clearly shown in it a means of bringing the study of races under arithmetical calculation, a step which will do much to bring anthropology among the exact sciences.—The new president is Major-General A. Pitt-Rivers, F.R.S.

**Physical Society,** February 12.—Prof. W. G. Adams in the chair.—This being the annual general meeting, the yearly report was read by the Chairman. The report showed that the Society now numbered 321 members as against 298 of last year. Two eminent members, Sir T. H. Elliot and the Rev. Arthur Rigg, had been lost by death. The Society had decided to republish the scientific papers of Dr. Joule in a collected form.—Dr. Atkinson, treasurer, read the balance-sheet for the past year, which showed the Society to be flourishing.—The new Council and Officers were then elected, Sir W. Thomson retaining the presidency.—Mr. Bakewell and Herr G. Wiedemann were created Honorary Members.—Votes of thanks were passed to the Lords Commissioners of the Council of Education for granting the use of the meeting-room to the Society, to Prof. Adams and to Dr. Guthrie, the demonstrator, the auditors, and the secretaries, Professors Rheinhold and Roberts.—The meeting was then resolved into a special general meeting, and a resolution put and carried giving the Council power to invest money of the Society in the name of the Society, or of persons appointed by them, in certain stock, home and foreign.—The meeting was then constituted an ordinary one, and Mr. T. Wrightson, C.E., read a paper by Prof. Chandler Roberts and himself on the density of fluid bismuth. By means of the oncosimeter, an instrument which records on a band of paper the sinking or floating effect of a ball of the solid metal immersed in the molten metal, they had determined the density of fluid bismuth from six experiments to be 10·055. A former value by a different method was 10·039. In the discussion which ensued, Mr. Wrightson stated that his experiments proved solid cast iron to be heavier than fluid, and to sink in the latter when first immersed, but it rapidly became lighter as its temperature rose, till it floated when in its plastic state, and was consequently lighter than when in the molten state. The oncosimeter could be utilised for determining the change of volume in melting rocks, and Prof. Chandler Roberts suggested that it might throw light on the difference of state between the carbon of grey pig and white iron.—Dr. O. J. Lodge exhibited working models showing the hydrostatic analogies between water and electricity. A battery was represented by a pump, conductors by open pipes, dielectrics by a pipe closed by an elastic membrane, electrometers by pressure gauges. With these analogues he showed the action of a Leyden jar, and the passage of telegraphic signals along a cable.

**Geological Society,** February 2.—Robert Etheridge, F.R.S., president, in the chair.—Joseph Groves, George Lewis, Rev. Edouard Méchin, S.J., James Osborne, and the Rev. William Sharman were elected Fellows of the Society.—The following communications were read:—On the coralliferous series of Sind and its connection with the last upheaval of the Himalayas, by Prof. P. Martin Duncan, F.R.S.—This communication is the result of the author's study and description of the fossil corals of Sind, undertaken at the request of the Geological Survey of India. The history of the researches in the geology of the Tertiary deposits of Western Sind was noticed in relation to a statement made some years since by the author and Mr. H. M. Jenkins, F.G.S., that there was more than one Tertiary series there, in opposition to both D'Archiac and Haime. After a brief description of the geology of the Khirthar and Laki ranges of hills, which were called Hala Mountain by the French geologists, the succession of the stratigraphical series demonstrated by the survey under Blanford and Fedden was given, and the author proceeded to discuss the peculiarities of the six coral faunas of the area, and to argue upon the conditions which prevailed during their existence. A transitional fauna, neither Cretaceous nor Eocene, underlies a trap; to the trap suceeds a great development of Nummulitic beds containing corals, the Ranikot series, some of which are gigantic representatives of European Nummulitic forms. A third fauna, the Khirthar, succeeds, and a fourth, Khirthar-Nari, which was a reef-building one; and a fifth, the Nari, is included in the Oligocene age. An important Miocene coralliferous series (the Gaj) is on the top of all. These faunas above the trap are Nummulitic, Oligocene, and Miocene in age, and in the first two European forms which are confined to definite horizons, are scattered indefinitely in a vertical range of many thousands of feet. The corals grew in shallow seas, but most of them were not massive limestone builders, but there were occasional fringing reefs, or rather banks of compound forms, which assisted in the development of limestones. Many genera of corals which elsewhere are massive are pedunculate in Sind, and the number of species of the family Fungidæ is considerable. There are also alliances with the Eocene coral fauna of the West Indies. The depth of the coralliferous series and the intercalated unfossiliferous sandstones, &c., is, according to the Survey, 14,000 feet, without counting an estimated 6000 feet of unfossiliferous strata in one particular group. The subsidence has therefore been vast, but not always continuous. After noticing the numbers of genera and species in this grand series of coral faunas and the remarkable distinctness of each, the author proceeded to discuss the second part of his subject. When president of the Society he had stated in his anniversary address for 1878 that he was not convinced of the truth of the theory of the Geological Survey of India regarding the Pliocene age of the last Himalayan upheaval. The considerations arising from the position of a vast thickness of sedimentary deposits overlying the Gaj or marine Miocene, and containing *Amphicyon, Mastodon, Dinotherium*, and many Artiodactyles of the supposed pig-like ruminant group, lead to the belief that the author was not justified in opposing the theory enunciated by Lyddeker and the directors of the Survey. The position of these Manchhar strata on the flanks of the mountain system of Sind was compared with that of the sub-Himalayan deposits. The faunas were compared, and the Sewalik deposits, the equivalents of the Upper Manchhar series of Sind, were pronounced to be of Pliocene age. They were formed before and during the great upheaval of the Himalayas, and in some places are covered with glacial deposits. A comparison was instituted between these ossiferous strata and the beds of Eppelsheim and Pikermi, and the author discussed the question relating to the age of terrestrial accumulations overlying marine deposits.—On two new crinoids from the Upper Chalk of Southern Sweden, by P. H. Carpenter, M.A. Communicated by Prof. P. Martin Duncan, F.R.S. Stem-joints of a crinoid resembling those of *Bourgueticrinus* have long been known in the Plänerkalk of Streben (Elbe); but on the discovery of the calyx it was found to differ considerably from that genus. It was then referred to the genus *Antedon* by Prof. Geinitz. Stems also resembling *Bourgueticrinus* have been found in the upper chalk of Köpinge (S. Sweden), and a calyx resembling that described by Prof. Geinitz has also been found. Prof. Lundgren kindly entrusted this to the author for description. For these two fossils he considers not only a new genus but also a new family required. He proposes for the former the name *Mesocrinus*, as the characters of its calyx ally it to the Pentacrinidæ. The author describes the characteristics of the genus *Mesocrinus* and of the species *M. suecica* (the Swedish) species, and its differences from *M. fischeri* (from Streben), and discusses the relationships of the genus, which combines the characters of a *Pentacrinus*-calyx with a *Bourgueticrinus*-stem.—A new species of Comatula (*Antedon impressa*) from the Ignaherga limestone of Scania was also described, and its systematic position discussed.

**Entomological Society**, February 2.—Mr. H. T. Stainton, president, in the chair.—The president thanked the Society for electing him to that office, and nominated Sir John Lubbock, Bart., and Messrs. Meldola and Distant as vice-presidents for the ensuing year. Two new members were then elected.—Exhibitions and communications:—Mr. O. Salvin exhibited two boxes of insects collected by Mr. Champion in Guatemala.—Mr. W. A. Forbes exhibited a leaf from New Britain, having a curious filamentous growth upon it, caused by a *Coccus;* and also the larva of one of the *Blattidæ*, from Pernambuco, which presented a remarkable resemblance to an Isopod crustacean.—Mr. R. McLachlan exhibited a coleopterous larva from South America attacked by a fungoid parasite (*Sphæria*), and a *Noctua* from South Wales similarly attacked by an *Icasia*. He also exhibited *Thore concinna*, a beautiful new dragon-fly from Ecuador.—Mr. T. R. Billups exhibited *Pezomachus distincta*, a hymenopterous insect new to Britain; and a new species of *Stibentes*.—Mr. F. P. Pascoe exhibited a specimen of *Peripatus Novæ-Zealandiæ*, and made some observations on the structure and affinities of this anomalous genus.—Mr. W. L. Distant exhibited a new species of *Platypleura* from Madagascar.—Mr. W. F. Kirby announced the death of Dr. Gabriel Koch, of Frankfort-on-the-Main, the author of several works on the geographical distribution of *Lepidoptera*.—Mr. R. Meldola read a letter from M. André in reply to some criticisms made at a former meeting of the Society respecting the publication of new species on the wrapper of a periodical work.—The Secretary read a cutting from an Australian newspaper, communicated by Mr. G. Giles, relative to the death of a child, in consequence, as was supposed, of the bite of a small spider.—Papers read:—Mr. A. G. Butler communicated a paper entitled "Descriptions of new genera and species of Heterocerous *Lepidoptera* from Japan."—Mr. R. McLachlan read some notes on *Odonata* of the sub-families *Corduliinæ, Calopteryginæ*, and *Agrioninæ* (Legion *Pseudostigma*) collected by Mr. Buckley in the district of the Rio Bobonaza in Ecuador.—Mr. W. F. Kirby read a list of the Hymenoptera of New Zealand, in which eighty-two species were enumerated, five being described as new.—Mr. Joseph S. Baly communicated a paper entitled descriptions of new species of *Galerucidæ*.

**Victoria (Philosophical) Institute**, February 21.—A paper on the implements of the Stone age as a primitive demarcation between man and other animals, by Dr. Thompson, LL.D., of Harvard University, was read; after which a second brief paper on the caves of Devonshire was read by Mr. Howard, F.R.S., in which the author, as a chemist, pointed out the important bearing that the new investigations into the mode of formation of the cave floor had upon the whole question at issue.

### VIENNA

**Imperial Academy of Sciences**, February 17.—V. Burg in the chair.—Prof. Schmarda presented a paper by Henry B. Brady, F.R.S., on Arctic foraminifera from soundings obtained on the Austro-Hungarian North Pole Expedition of 1872-74. It will be published in the *Denkschriften der Academie*.—F. Steindachner, ichthyological materials (part 10).—F. Wald, studies on chemical processes producing energy.—E. Brücke, supplement to his communication of January 7 on an uncrystallisable acid obtained by oxidation of egg albumen. It is not a pure substance, but a mixture.—E. Weiss, on the computation of the differential quotients of the radius vector and the apparent anomaly in orbits of great excentricity.—T. V. Rohon, on *Amphioxus lanceolatus*.—Dr. Td. H. Skraup, on synthetical experiments in the Chinolin series.

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